New taxa in *Gonocarpus* and *Haloragis* (Haloragaceae)

A.E. Orchard

Tasmanian Herbarium, G.P.O. Box 252c, Hobart, Tasmania 7001

Abstract

Orchard, A.E. New taxa in *Gonocarpus* and *Haloragis* (Haloragaceae). Nuytsia 5(3):327-339(1986). Five species of of *Gonocarpus* and two subspecies of *Haloragis* are described as new. *G. ephemerus, G. hispidus* and *G. ericifolius* are from southern Western Australia while *G. effusus* and *G. urceolatus* are from south-eastern Queensland. *Haloragis acutangula* in Western Australia has been re-examined and a new name *H. acutangula* f. *stellata* is proposed to replace "*H. acutangula* f. *occidentalis*" which moves into the synonymy of *H. digyna*. The range of *H. prostrata* is greatly extended, with new subspecies described from the Cook Islands (subsp. *coquana*) and from Tuvalu (subsp. *tuvaluensis*).

Introduction

Work in progress towards an account of Haloragaceae for the "Flora of Australia" has revealed several new species of *Gonocarpus,* based on collections made, for the most part, after publication of my revision of the genus (Orchard 1975). They are described here in greater detail than would be possible in the "Flora", to make the names available for use in the interim.

Gonocarpus ephemerus A.E. Orchard, sp. nov. (Figure 1)

Herba annua 8-15 cm alta; caules graciles, sparsim pilosi pilis patentibus 2-3-cellularibus hyalinis 0.2-0.25 mm longis. Folia opposita (alterna ad basim inflorescentiae), petiolo 2-3 mm longo; lamina ovata, 8-11 mm longa, 4-7 mm lata, margine incrassato, hyalino, serrato dentibus 8-12 parvis, sparsim pilosa ubi juvenia, glabrescentia. Bracteae lanceolatae vel oblanceolatae, 1.2-1.7 mm longae, 0.3-0.7 mm latae, margine incrassato, integro. Bracteolae membranaceae, orbiculares 0.2 mm diametro, in margine ciliato vel subdentato. Flores pedicellis 0.5-0.6 mm longis insidentes. Sepala 4, ovata, 0.5 mm longa, 0.45 mm lata, margine incrassato. Petala 4, flava vel rubra, cucullata, carinata, 1.6 mm longa, 0.4 mm lata (carina ad marginem). Stamina 8, antheris anguste oblongis, 1.3 mm longis, 0.25 mm latis, non apiculatis. Styli 4, clavati, 0.2-0.3 mm longi, stigmatibus capitatis, albis, fimbriatis. Ovarium olivaceum, urceolatum, 0.9 mm longum, 0.8 mm diametro, 8-costatum protruberationibus conicis ca 4 inter uterque par costatum ad basim. Fructus griseus vel ligneus, urceolatus, 1.6 mm longus (sepala inclusa), 0.9 mm diametro in collo valde 8-costatus, basi bulbosa infirme 8-costatus protruberationibus conicis 4 inter uterque par costarum, glaber, vernicosus.

Typus: c. 45 km E of Millbillillic H/S on Barwidgie road, Western Australia, 26°39'S, 120°44'E, spinifex sand plain, 3 May 1978, *L.A. Craven* 5375 (holo: CANB 285596).

Annual *herb* 8-15 cm tall, branching at base; *stems* slender, sparsely pilose with spreading 2-3-celled transparent simple hairs 0.2-0.25 mm long. *Leaves* opposite (becoming alternate at base of inflorescence), with petiole 2-3 mm long, ovate, lamina 8-11 mm long, 4-7 mm wide, midrib prominent below, margin thickened, hyaline, with 8-12 small teeth, sparsely pilose when young, becoming glabrous. *Inflorescence* spike-like with flowers borne singly

in the axils of alternate reduced leaves (bracts). *Bracts* green, lanceolate to oblanceolate, 1.2-1.7 mm long, 0.3-0.7 mm wide, margins entire, thickened. *Bracteoles* membranous, orbicular, minute, 0.2 mm diam., ciliate to subdentate on margins. *Pedicels* 0.5-0.6 mm long. *Sepals* 4, green, ovate, 0.5 mm long, 0.45 mm wide, margins thickened, glabrous. *Petals* 4, yellow to red, hooded, keeled, clawed, 1.6 mm long, 0.4 mm wide (keel to margin), sparsely pilose on keel, becoming reflexed at anthesis. *Stamens* 8; filaments lengthening to 0.6 mm; anthers narrowly oblong, 1.3 mm long, 0.25 mm wide, non-apiculate. *Styles* 4, clavate, 0.2-0.3 mm long; stigmas capitate, white, fimbriate. *Ovary* olive, urceolate, 0.9 mm long, 0.8 mm diam., 8-ribbed with about 4 conical protruberances between the pairs of ribs in the lower (bulbous) part. *Fruit* silver-grey to yellow-brown, urceolate, 1.6 mm long (incl. sepals), 0.9 mm diam., strongly 8-ribbed on neck, weakly 8-ribbed on bulbous part, with 4 conical protruberances between each pair of ribs in lower half, shiny, glabrous.

Distribution. Known only from the type from east of Wiluna in Western Australia.

Ecology. Growing on a spinifex (*Triodia*) sand plain, flowering and fruiting in May.

G. ephemerus is closely allied to *G. pycnostachyus* but differs in its glabrous fruits with 8 vertical rows of 4 tubercles instead of 2 transverse rows. There are also minor differences in the sizes of the floral parts.

The specific epithet refers to the obviously short life span of this plant.

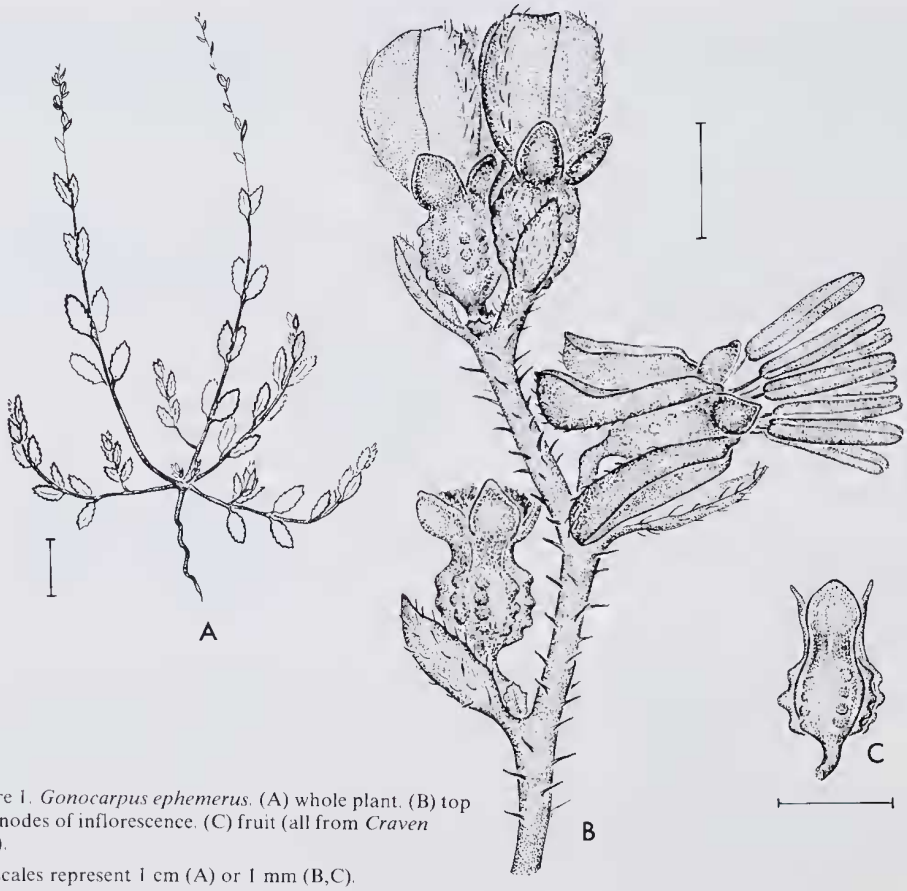

Figure 1. *Gonocarpus ephemerus*. (A) whole plant. (B) top four nodes of inflorescence. (C) fruit (all from *Craven* 5375).

Bar scales represent 1 cm (A) or 1 mm (B,C).

Gonocarpus hispidus A.E. Orchard, sp. nov. (Figure 2A-E)

Fruticulus usque ad 16 cm altum; caules erecti vel ascendentes, dense hispidi pilis patentibus albis 3-4-cellularibus 0.4-0.5 mm longis. Folia alterna, dense congesta, linearia, 6-7 mm longa 0.8-1.0 mm lata, obtusa, succulenta, dense hispida pilis atque caulibus in tuberculis albis insidentibus. Bracteae ovatae vel lanceolatae, 2.5 mm longae, 1.25 mm latae. Bracteolae ovatae, 1.3 mm longae, 0.6-0.7 mm latae, in carina hispida. Flores in pedicellis 0.7 mm longis insidentes, nutantes. Sepala 4, viride, late ovata, 0.6 mm longa, 0.7 mm lata. Petala 4, atro-rubra, cucullata, carinata, 2.2 mm longa, 0.6 mm lata (carina ad marginem), in carina grosse hispida. Stamina 8, antheris anguste oblongis, 1.2 mm longis, non apiculatis. Styli 4, clavati, stigmatibus capitatis, albis, breviter fimbriatis. Ovarium atro-purpureum, turbinatum, 0.75 mm longum, 0.75 mm latum valde et acute 8-costatum, in costis grosse hispidis. Fructus maturis non visus sed certe ovario simili.

Typus: Base of East Mt Barren, Western Australia, stony quartzitic sand, 14 Sept. 1974, *K. Newbey* 4370 (holo: PERTH).

Subshrub to 16 cm tall; *stems* erect or ascending, slightly wrinkled longitudinally, densely hispid with spreading white 3-4-celled simple hairs 0.4-0.5 mm long. *Leaves* alternate, densely crowded, sessile, linear, 6-7 mm long, 0.8-1.0 mm wide, obtuse, fleshy, densely hispid with hairs as for stems seated on whitish tubercles. *Inflorescence* spike-like with flowers borne singly in the axils of ovate to lanceolate bracts 2.5 mm long, 1.25 mm wide. *Lateral inflorescences* arise in axils of upper leaves. *Bracteoles* yellow, somewhat fleshy, ovate, 1.3 mm long, 0.6-0.7 mm wide, with a dark reddish midrib, hispid on keel. *Flowers* on pedicels 0.7 mm long, nodding. *Sepals* 4, green, broadly ovate, 0.6 mm long, 0.7 mm wide, glabrous. *Petals* 4, deep red, hooded, keeled, shortly clawed, 2.2 mm long, 0.6 mm wide (keel to margin), coarsely hispid on keel. *Stamens* 8; anthers narrowly oblong, 1.2 mm long, 0.3 mm wide, non-apiculate. *Styles* 4, clavate, stigmas capitate, white, shortly fimbriate. *Ovary* dark purple-black, turbinate, 0.75 mm long, 0.75 mm wide, strongly and sharply 8-ribbed, coarsely hispid on ribs. *Fruit* unknown, but certainly very similar to ovary.

Distribution. Known only from the type, from East Mt Barren in southern Western Australia.

Ecology. Grows in stony quartzite sand. Flowers in mid September.

G. hispidus closely resembles *G. pithyoides* but differs in its shorter more crowded leaves, harsher hispid hairs, hispid (not glabrous) stems, broader hispid bracteoles and more strongly ribbed ovary.

The distinctive coarse hairs of this species are the basis of the specific epithet.

Gonocarpus ericifolius A.E. Orchard, sp. nov. (Figure 2F-K)

Fruticulus 10-15 cm altus, multicaulis; caules e basi praecipue ramosi, moderate dense strigosi pilis appressis albis unicellularibus 0.4-0.5 mm longis. Folia alterna erecta dense imbricata infra, magis dispersa super, teretia, 4.0-7.5 mm longa, 0.7-1.0 mm lata, acuta, parum canaliculata super, moderate dense pilosa pilis semipatentia ut in caulibus. Inflorescentiae nutantes. Bracteae lineari-lanceolatae, 2.5-3.0 mm longae, integrae, scabrae. Bracteolae lineares 0.5-0.7 mm longae, integrae. Flores pedicellis 0.4-0.5 mm longis, insidentes, nutantes. Sepala 4, olivacea lanceolata 1.25 mm longa, 0.5 mm lata crassa semipatentia margine minute ciliato. Petala 4, rubra, cucullata, valde carinata, 2.2 mm longa, 0.6 mm lata (carina ad marginem), pilis rigidis semipatentibus in carinis, post

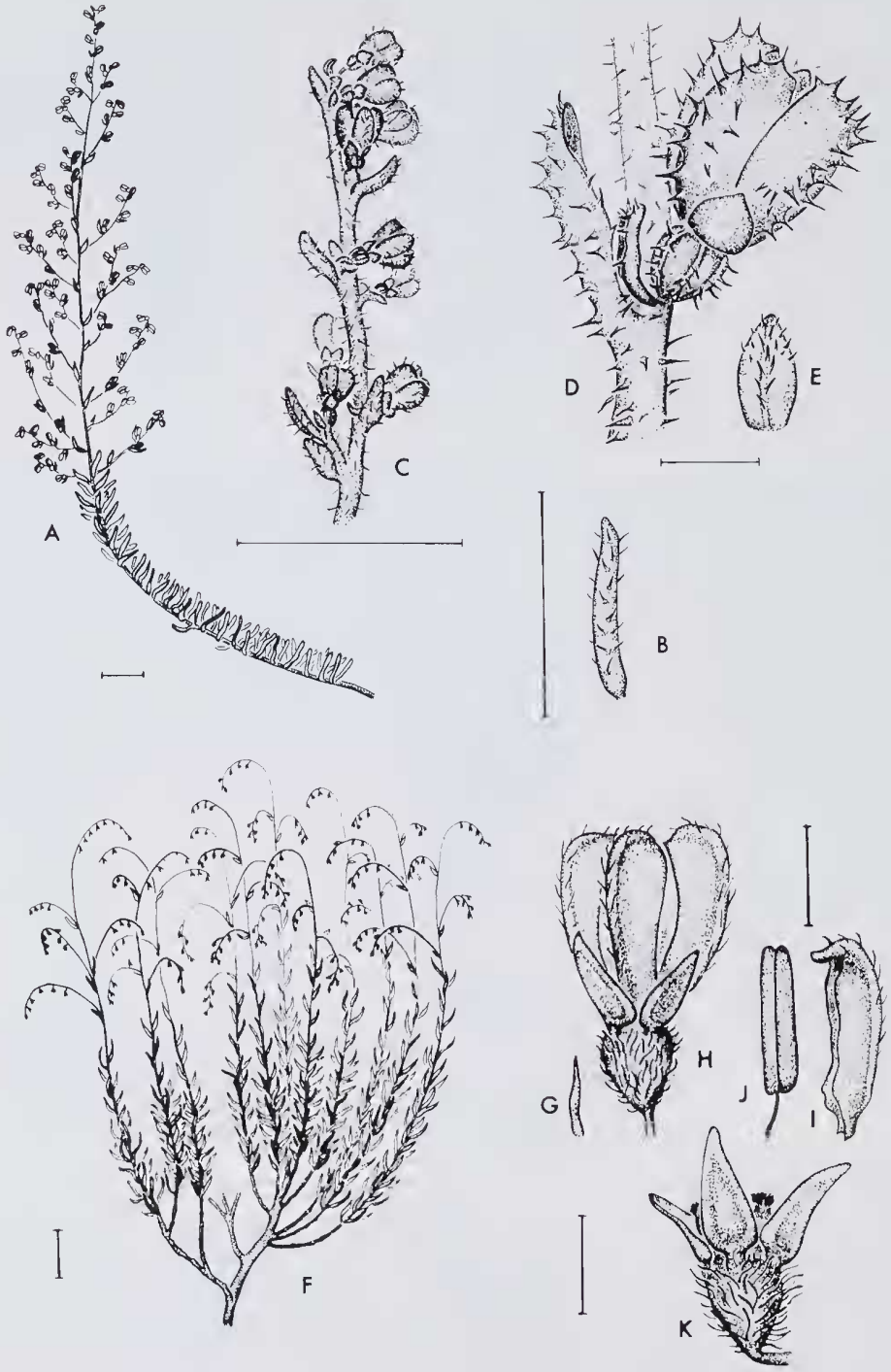

Figure 2. *Gonocarpus* spp. (A-E) *G. hispidus*. (A) flowering branch. (B) leaf. (C) top portion of inflorescence. (D) flower in axil of bract. (E) bracteole. (F-K) *G. ericifolius*. (F) habit. (G) bracteole. (H) flower. (I) petal. (J) stamen. (K) fruit. (A-E *Newbey* 4370; F-K, *Barnsbey* 980).

Bar scales represent 1 cm (A,B,C,F) or 1 mm (others).

anthesin effusa et plusminusve persistentia. Stamina 8, antheris anguste oblongis 1.5 mm longis non apiculatis. Styli 4, clavati, 0.5 mm longi, stigmatibus capitatis flavis fimbriatis. Ovarium ardesiacum, turbinatum 0.8 mm longum, 0.8 mm diametro dense pilosum pilis semipatentibus albis vel brunneolis. Fructus turbinatus 0.8 mm longus, 0.8 mm diametro, dense pilosus, sepalis persistentibus in angulo 45° patentibus, petalis item persistentibus.

Typus: 33 km E of Pingaring along road to Varley, Western Australia, 32°44'S, 118°56'E, gravelly sand over laterite, tall heath with *Casuarina campestris,* 29 Jan. 1979, *B. Barnsley* 980 (holo: CBG 7902172; iso: HO).

Semiwoody *subshrub* 10-15 cm tall, multistemmed; *stems* branching mainly at base, moderately densely strigose with appressed simple white unicellular hairs 0.4-0.5 mm long. *Leaves* alternate, erect, densely imbricate in lower parts of stem, more widely spaced above, sessile, terete, 4.0-7.5 mm long, 0.7-1.0 mm wide, acute, slightly channelled above, moderately densely pilose with semi-spreading hairs as for stems. *Inflorescence* indeterminate spike-like with flowers borne singly in the axils of reduced leaves (bracts). *Lateral inflorescences* arising in axils of the upper leaves. Main and lateral inflorescences nodding. *Bracts* linear-lanceolate, 2.5-3.0 mm long, entire, fleshy, scabrous. *Bracteoles* red, linear 0.5-0.7 mm long, entire. *Flowers* pendant on glabrous pedicels 0.4-0.5 mm long. *Sepals* 4, olive-green, lanceolate, 1.25 mm long, 0.5 mm wide, thick, semi-spreading, minutely ciliate on margin. *Petals* 4, red, hooded, strongly keeled, clawed, 2.2 mm long, 0.6 mm wide (keel to margin) with stiff semi-appressed hairs on keel, spreading and more or less persistent after anthesis. *Stamens* 8; filaments lengthening to 0.5 mm; anthers narrowly oblong, 1.5 mm long, 0.3 mm wide, non-apiculate. *Styles* 4, clavate, 0.5 mm long, stigmas capitate, yellow, fimbriate. *Ovary* dark grey, turbinate, 0.8 mm long, 0.8 mm diam., densely clothed in semi-appressed white to brownish hairs as for stems. *Fruit* turbinate, 0.8 mm long, 0.8 mm diam., densely pilose, sepals persistent and spreading at 45°, petals also more or less persistent.

Distribution. Known only from the type from the Lake Grace district of Western Australia.

Ecology. Rare in tall heath with *Casuarina campestris,* on gravelly sand flats over laterite. Flowering and fruiting in January.

G. ericifolius seems to be related to *G. pithyoides* from which it differs mainly in the size and shape of its sepals. *G. pithyoides* is often more or less glabrous in all of its parts, or has hairs confined to the ovary only. *G. ericifolius* is stiffly strigose/pilose in all of its parts. This species differs from *G. hispidus* in its sepal shape and size, in its nodding inflorescence, and in its less robust semi-appressed to appressed hairs.

The specific epithet alludes to the similarity of the foliage of this species to that of some *Erica* species, e.g. *E. baccans.*

Gonocarpus effusus A.E. Orchard, sp. nov. (Figure 3A-E)

Frutex; caules profuse ramosi 4-angulati, sparsim strigosi, trichomatibus bicellularibus hyalinis 0.25-0.3 mm praecipue ad angulos limitatis. Folia opposita (alterna in ramulos ultimos), late disposita, ovata, 4-5 mm longa, 3 mm lata, discoloria, breviter (0.4-0.5 mm) petiolata, margine incrassato hyalino minute 4-6-dentato, in superficiebus ambabus sparsim strigosis. Bracteolae cinnamomeae, lanceolatae (rare oblanceolatae) vel trifidae, 0.5 mm longae, 0.2-0.25 mm latae, scabrae. Flores pedicellis 0.2 mm longis insidentes. Sepala 4 ovata vel deltoidea, 0.6 mm longa, 0.3 mm lata, margine incrassato hyalino, callo mediano basali. Petala 4 atropurpurea, cucullata, carinata, 1.8-2.1 mm longa, 0.5-0.6 mm lata (carina ad marginem), in carina strigosa. Stamina 8; antheris auguste oblongis 1.4-

1.5 mm longis, non apiculatis. Styli 4, clavati, 0.2-0.3 mm longi, stigmatibus capitatis flavis fimbriatis. Ovarium atropurpureum, ovoideum, 0.8 mm longum, 0.5 mm latum, plusminusve laeve, strigosum. Fructus plumbeus anguste ovoideum, 1.0 mm longus, 0.6 mm latus, 8-costatus inter costas laevis vel tuberculis 1-2 parvis, in costis minute strigosis.

Typus: Mt Ngungun, Glasshouse Mtns, Moreton District, Queensland, 26°54'S, 152°56'E, 180 m alt., open rocky (trachyte) slopes, shrub community, 2 Oct. 1973, *I.R. Telford* 3399 (holo: CBG 8202121).

Straggling *shrub*; stems brown, 4-angled, profusely branched, sparsely strigose with transparent 2-celled hairs 0.25-0.3 mm long confined mainly to the angles. *Leaves* opposite (becoming alternate on ultimate branchlets) widely spaced, ovate, 4-5 mm long, 3 mm wide, excluding a short (0.4-0.5 mm) petiole, discolorous, with thickened hyaline margins, minutely 4-6-toothed, almost glabrous with sparse appressed scabrous hairs on each surface. *Inflorescence* simple, spike-like, flowers borne singly in the axils of alternate reduced leaves (bracts) to 2 mm long. *Bracteoles* reddish brown, lanceolate (rarely oblanceolate) to trifid, 0.5 mm long, 0.2-0.25 mm wide, entire or with 2-3 teeth, scabrous. *Flowers* on pedicel 0.2 mm long. *Sepals* 4, ovate to deltoid, 0.6 mm long, 0.3 mm wide, margins thickened, hyaline, median basal callus, glabrous. *Petals* 4, deep reddish purple, hooded, keeled, 1.8-2.1 mm long, 0.5-0.6 mm wide (keel to margin), strigose on keel with hairs as for stem. *Stamens* 8, anthers linear, 1.4-1.5 mm long, non-apiculate. *Styles* 4, clavate, 0.2-0.3 mm long, stigmas capitate, yellow, fimbriate. *Ovary* deep reddish purple, ovoid, 0.8 mm long, 0.5 mm diam., more or less smooth, strigose. *Fruit* dark silvery-grey, narrowly ovoid, 1.0 mm long, 0.6 mm wide, 8-ribbed, smooth between ribs or with 1-2 small tubercles, minutely strigose on ribs.

Distribution. Known only from the type from the Glasshouse Mountains of south-eastern Queensland.

Ecology. Growing in shrub community on open rocky slopes. Flowering and fruiting in October.

Gonocarpus effusus is clearly a member of the *G. oreophilus*/*G. longifolius*/*G. teucrioides* group found in forested areas throughout the Eastern Divide. Its distinctive characters are its small ovate leaves and sparse strigose hairs. From *G. teucrioides* it differs also in its small brown membranous (usually) toothed bracteoles, those of *G. teucrioides* being green, more or less fleshy, entire and larger. The four species are easily distinguished by, among other things, their hair type, best seen on young branchlets. The hairs of *G. effusus* are sparse, short and appressed, those of *G. oreophilus* are dense, short and velutinous (occasionally with a few long ones as well), those of *G. longifolius* are moderately dense, long, soft and spreading, while those of *G. teucrioides* are moderately dense, long and short, harsh and stiffly spreading.

The specific epithet alludes to the straggling habit of the plant.

Gonocarpus urceolatus A.E. Orchard, sp. nov. (Figure 3F-J)

Herba usque ad 30 cm altam: caules erecti pilosi pilis moderate dense patentibus 3-4-cellularibus hyalinis 0.5-0.6 mm longis. Folia sessilia opposita, late disposita, ovata 15-22 mm longa, 9-13 mm lata, margine incrassato hyalino grosse serrato dentibus 10-12, pilosa. Bracteae lanceolatae 2.5-3 mm longae 0.7-1.1 mm latae, margine incrassato hyalino integro. Bracteolae testaceae, digitatae c. 0.3 mm diametro. Flores pedicellis 0.8 mm longis insidentes. Sepala 4 lanceolata 1.0 mm longa 0.5 mm lata, basi callo rotundato, margine incrassato hyalino. Petala 4 virides vel atro-rubra, cucullata, carinata, 2.5 mm longa, 0.6

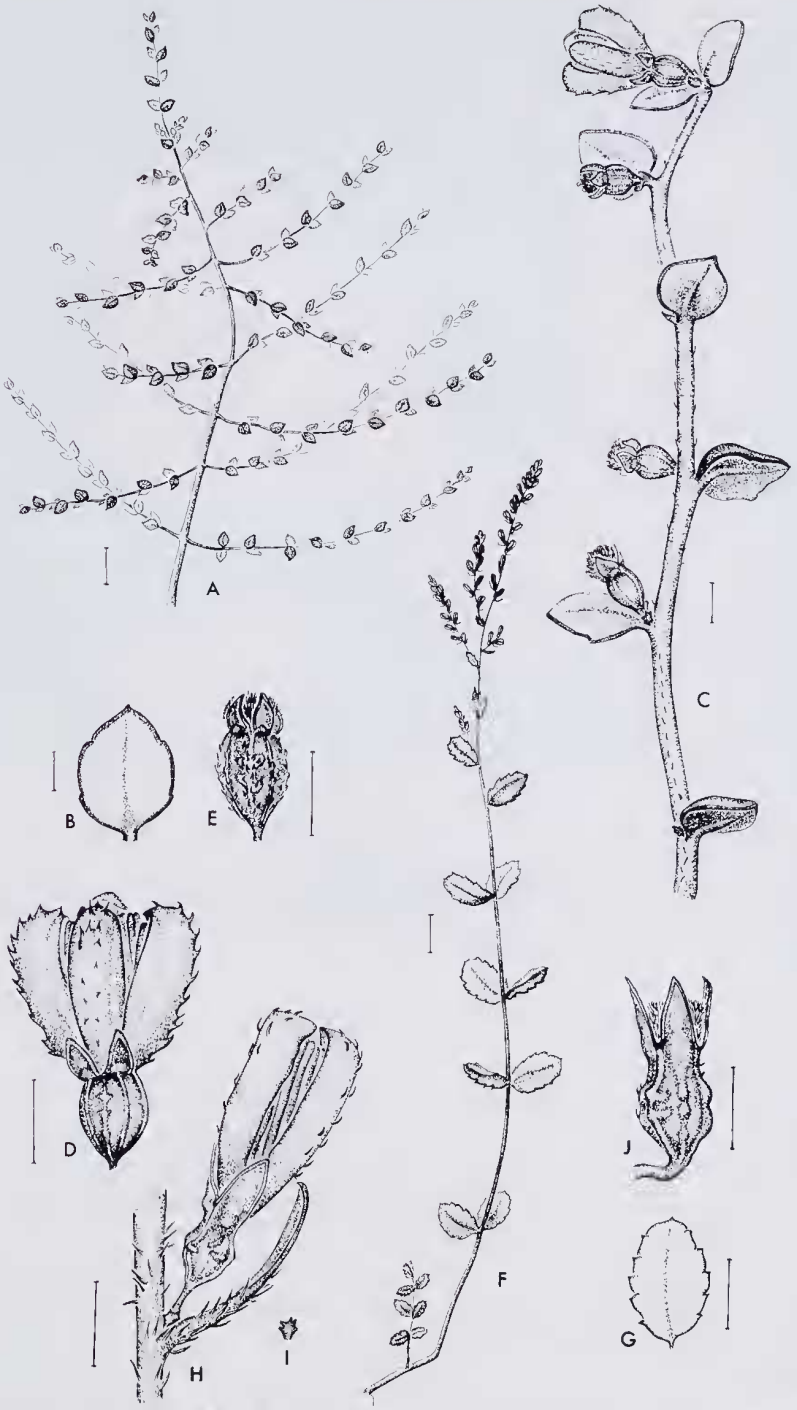

Figure 3. *Gonocarpus* spp. (A-E) *G. effusus*. (A) habit. (B) leaf. (C) inflorescence, (D) flower. (E) fruit. (F-J) *G. urceolatus*. (F) habit. (G) leaf. (H) flower in axil of bract. (I) bracteole. (J) fruit. (A-E, *Telford* 3399; F-J *Lithgow* s.n.).

Bar scales represent 1 cm (A,B,F,G) or 1 mm (others).

mm lata (carina ad marginem), in carina sparsim scabra. Stamina 8, antheris anguste oblongis 1.8 mm longis, non apiculatis. Styli 4, clavati, 0.3 mm longi, stigmatibus capitatis flavis fimbriatis. Ovarium atropurpureum nitens ovoideum usque ad urceolatum, 0.9 mm longum, 0.85-0.9 mm latum, 8-costatum callis 2 obliquis inter uterque par costarum; costis et callis plumbeis. Fructus plumbeus urceolatus, 2 mm longus (sepalis viridibus persistentibus inclusis), 1.1 mm latus, valde 8-costatus longistrorsum, callis 2 magnis V-formibus in costis antipetalis, pilis scabris aliquot in costis.

Typus: Chinchilla area, Queensland, near roadside drain in bulloak soil, Oct. 1978, *M.G. Lithgow* s.n. (holo: BRI 241683).

Herb to 30 cm tall; *stems* branched only at base, erect, pilose with moderately dense simple, spreading 3-4-celled transparent hairs 0.5-0.6 mm long. *Leaves* sessile, opposite, widely spaced, flat, ovate, 15-22 mm long, 9-13 mm wide, margin thickened, hyaline, coarsely serrate with 10-12 cuspidate teeth; sparsely pilose with hairs as for stems. *Inflorescence* simple, spike-like with flowers borne singly in the axils of alternate reduced leaves (bracts). *Bracts* lanceolate, 2.5-3 mm long, 0.7-1.1 mm wide, margins entire, thickened, hyaline. *Bracteoles* yellow-brown, digitate, c. 0.3 mm diam. *Flowers* on pedicel 0.8 mm long. Sepals 4, green, lanceolate, 1.0 mm long, 0.5 mm wide, rounded swollen callus at base, otherwise smooth, margins thickened, hyaline, glabrous. *Petals* 4, green to deep red, hooded, keeled, clawed, 2.5 mm long, 0.6 mm wide (keel to margin), sparsely scabrous on keel. *Stamens* 8; filaments elongating to 1.3 mm long; anthers narrowly oblong, 1.8 mm long, 0.3 mm wide, non-apiculate. *Styles* 4, clavate, 0.3 mm long, stigmas capitate, yellow, fimbriate. *Ovary* deep reddish purple, shiny, ovoid to urceolate, 0.9 mm long, 0.85-0.9 mm wide, 8-ribbed with 2 oblique calluses between each pair of ribs, ribs and calluses silver-grey. *Fruit* silver-grey, urceolate, 2 mm long (including persistent greenish sepals), 1.1 mm diam., strongly 8-ribbed longitudinally with 2 large V-shaped calluses on antipetalous ribs, occasional scabrous hairs on ribs.

Additional specimen examined. In NSW there is a second collection of this species (NSW 99014) which has been attributed to Leichhardt. It has a small label written in pencil reading "135. On the banks of the northern branch of N . . . . . Creek 6 Jun 47". The name of the creek is indecipherable. On 6th June 1847 Leichhardt was camped south of Peak Hill in Queensland, somewhere in the vicinity of the present towns of Emerald and Springsure.

Distribution. Known only from two collections from the Chinchilla and Emerald districts of south-eastern Queensland.

Ecology. "Near roadside drain in bulloak soil". Flowering and fruiting in October.

G. urceolatus seems to be unrelated to any of the other eastern species. In most respects it comes closest to *G. pycnostachyus* of Israelite Bay in southern Western Australia, or *G. confertifolius* of the Western Australian goldfields but is distinct from both in its larger, more coarsely serrate sessile leaves, in fruit ornamentation and in its glabrous sepals.

The specific epithet alludes to the distinctive fruit shape, shared (in broad terms) with only 2-3 other species in the genus.

Haloragis acutangula F. Muell.

In a previous paper (Orchard 1977) I mentioned possible confusion between this species and *H. digyna* that may have occurred in the course of my description of *H. acutangula* f. *occidentalis*. At that time I had not re-examined the type specimen, but this has now

been done. I find that although Western Australian plants of *H. acutangula* do exist and answer the description given by me in 1975, the type specimen chosen then (and a couple of other specimens cited) in fact belong to *H. digyna*. The unfortunate consequence is that the name *Haloragis acutangula* f. *occidentalis* Orchard must now be placed in the synonymy of *H. digyna* and a new name and type is necessary for the Western Australian forma of *H. acutangula*. The following specimens cited in Orchard (1975) under "*H. acutangula* f. *occidentalis*" have now been re-identified as *H. digyna*: *Gardner* s.n., 18.xii. 1940, Esperance (PERTH): *O.I.C. Esperance* 112, Esperance (PERTH); *Orchard* 1726, 1728, 3 km NE Esperance (AD, AK); *Royce* 6316, 1 mile N of Esperance, (PERTH) — type of *H. acutangula* f. *occidentalis*.

Haloragis acutangula f. **stellata** A.E. Orchard, f. nov.

Fructus brevior quam latior, 1.5-2.0 mm longus (sepala exclusa), 2.0-3.3 mm latus; alae magnae deltatae in medio fructu tota longitudo fructo occupans; callus inter alas absens.

Typus: near small cove below limestone cliffs on eastern side of Middle Island, Recherche Archipelago, Western Australia, 10 Nov. 1974, *A.S. Weston* 9837 (holo: PERTH; iso: CANB).

Specimens examined. WESTERN AUSTRALIA: *Bennett* s.n., Albany, -.i.1941 (PERTH); *Maxwell* s.n., near King Georges Sound (MEL 1003759); *Weston & Trudgen* 8758, Middle Island, Recherche Archipelago, 17.xi.1973 (CANB, PERTH); *Willis* s.n., Boxer Island, Recherche Archipelago, 8.xi.1950 (MEL 38930); *Willis* s.n., Middle Island, 23.xi.1950 (MEL 38931, PERTH).

SOUTH AUSTRALIA: *Copley* 2633, 25 km SE Yalata, 27.vii.1969 (AD); *Orchard* 3101, 3102, 3104, 7 km SSE Mt Hope, 2.i.1971 (AD); *Orchard* 3159, SE end Yalata Aboriginal Reserve, 5.i.1971 (AD).

Haloragis prostrata J.R. & G. Forst.

Since publication of my revision (Orchard 1975) this Pacific species, the type of the genus, has had its range extended dramatically, from New Caledonia to Tuvalu and the Cook Islands. Both of these outlying populations differ from the typical New Caledonian plants in a number of respects, and are recognised below as new subspecies.

Key to the subspecies of *H. prostrata*

1. Plants glabrous
   2. Petals 1.5-1.8 mm long ..... subsp. *prostrata*
   2. Petals 2.9 mm long ..... subsp. *coquana*
1. Plants with a fine dense indumentum ..... subsp. *tuvaluensis*

H. prostrata subsp. **prostrata**

See Orchard (1975) pp. 84-5

H. prostrata subsp. **coquana** A.E Orchard, subsp. nov. (Figures 4A-E, 5)

A subsp. *prostrata* floribus magnis (petalis 2.9 mm longis, antheris 1.8 mm longis) et bracteolis usque ad 2.1-2.2 mm longis, differt.

Typus: Mitiaro, between Omapere and Kakari (east coast), Cook Islands, coastal makatea, level, with much sand, 22 July 1982, *W.R. Sykes* 2415/CI (holo: CHR 397621; iso: HO 72972, CANB).

Perennial glabrous *herb,* stems semi-prostrate to 25 cm long, smooth, the older ones 4-angled. *Leaves* decussate, oblanceolate to obovate, 25-35 mm long, 6-9 mm wide, more or less fleshy, entire, usually with a minute rounded apiculum at tip. *Inflorescence* simple, spike-like with fascicles of 3-5 flowers borne in axils of reduced leaves (bracts). *Lateral inflorescences* arise in axils of upper leaves. *Bracteoles* linear, 2.1-2.2 mm long, 0.4 mm wide, weakly midribbed, flat, acute. Secondary bracteoles similar but smaller. *Flowers* strongly protandrous, on pedicels 1.3 mm long. *Sepals* 4, deltoid, 1.0-1.1 mm long, 0.8 mm wide, smooth, erect. *Petals* 4, hooded, keeled, 2.5-2.9 mm long, 0.8 mm wide (keel to margin). *Stamens* 8, filaments elongating to 1.1 mm; anthers narrowly oblong, 1.6-1.8 mm long, 0.5 mm wide, non-apiculate. *Styles* 4, clavate, 0.8 mm long; stigmas capitate, yellow fimbriate. *Ovary* globular, 1.7 mm diam., slightly sulcate opposite petals. *Fruit* on pedicel 1.3 mm long, reddish, shining, globular, 2.1-2.9 mm in diam., weakly 8-lined longitudinally; developing small irregular tubercles at maturity; sepals persistent, more or less spreading.

Distribution. Confined to the island of Mitiaro in the Cook Islands.

Ecology. Mitiaro is a raised coral or makatea island, apart from three small patches in the middle. The *Haloragis* grows commonly to abundantly all around the outer parts of the island except for the first 20 metres or so in from the low cliff edge. It grows in the light shade of some of the outer, or seaward scrub forest, but best of all on the more open rough coral. The stronger the insolation the more reddish the plants are. The plants die back around July to September as only young vegetative shoots are present at this time. (W.R. Sykes pers. comm.)

This subspecies closely resembles subsp. *prostrata* differing mainly in its larger flowers and bracteoles. In my previous account of *H. prostrata* (subsp. *prostrata*) (Orchard 1975) I mentioned a large leaved form from "Isle St. Marie" probably collected by Lemée. As the species was at that time thought to be confined to New Caledonia the specimen was cited under that locality. Unfortunately the collection bore only young buds, but on leaf size and shape alone it is possible that it too belongs to subsp. *coquana* and that "Isle St. Marie" is Maria Is. in the Tubuai Islands. Removal of the (?) Lemée specimen from subsp. *prostrata* means modification of the range of leaf size for that subspecies is necessary, to 15-20 mm long and 5-6 mm wide.

The fruits on the type specimen are probably immature, and further collections could be anticipated with larger fruits.

H. prostrata subsp. **tuvaluensis** A.E Orchard, subsp. nov. (Figure 4F-I)

A subsp. *prostrata* indumento tenui denso pilorum brevium aureorum mollium crisporum patentium plantam totam tegentem, differt.

Typus: Ipota, Erromanga, New Hebrides, on coral rock above the high water tide mark, 10 Aug. 1971, *P.S. Green* RSNH 1328 (holo: K).

Annual (?) *herb* to 40 cm high, the whole plant with a fine dense indumentum of golden short (c. 0.01 mm) soft crisped spreading hairs; *stems* freely branched, somewhat fleshy, the older ones 4-angled. *Leaves* decussate, obovate, 25-45 mm long, 7-11 mm wide, entire, tip rounded with a short blunt apiculum, only midrib apparent. *Inflorescence* simple, spike-like, of fascicles of 3-5 flowers borne in the axils of slightly reduced leaves (bracts). *Bracteoles* lanceolate 1.0-1.2 mm long, 0.3 mm wide, weakly midribbed. *Flowers* on pedicels 1.5 mm long. *Sepals* 4, deltoid, 0.8 mm long, 0.8 mm wide, smooth, with crisped hairs on outer surface as for stems. *Petals* 4, yellow, hooded, keeled, 1.4 mm long, 0.6-0.7 mm

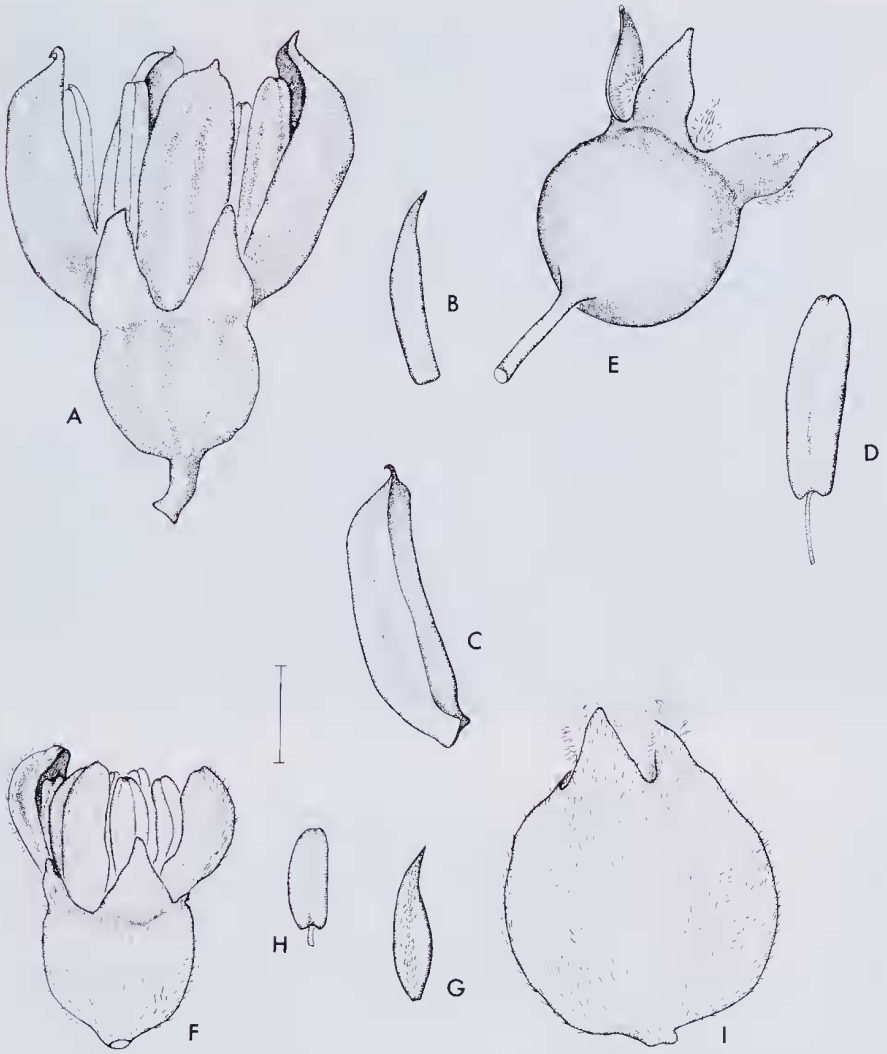

Figure 4. *Haloragis prostrata*. (A-E) subsp. *coquana*. (A) flower. (B) bracteole. (C) petal. (D) stamen. (E) immature fruit. (F-I) subsp. *tuvaluensis*. (F) flower. (G) bracteole. (H) stamen. (I) immature fruit. (A-E, *Sykes* 2415/CI; F-I, *Green* RSNH 1328).

Bar scale represents 1 mm (all illustrations).

wide (keel to margin). *Stamens* 8, filaments lengthening to 0.6 mm; anthers oblong, 1.0 mm long, 0.4-0.5 mm wide, non-apiculate. *Styles* 4, clavate, 0.6 mm long, stigmas capitate, cream, fimbriate. *Ovary* green, globular, 1.3 mm diam., smooth, with crisped hairs. *Fruit* green, globular, 2.5 mm diam., slightly 4-sulcate longitudinally opposite sepals; sepals remaining erect.

Other collection examined. TUVALU: *J. Raynal* RSNH 16003, Nouvelles-Hébrides, Efate, côte S entre Pointe Narabo et Baie François, arrière-plage a *Messerschmidia,* sur blocs coralliens, 30.vi.1971 (K).

Figure 5. *Haloragis prostrata* subsp. *coquana*, type specimen in situ. (A) habit. (B) flowers and young fruits.
(Photos by E.K. Cameron, Botany Dept., University of Auckland, per W.R. Sykes.)

Distribution. Known only from the islands of Erromanga and Efate in Tuvalu.

Ecology. Like the other subspecies this plant is confined to coral sand/rock on shorelines just above high water level, where it is locally abundant.

The subspecies is easily distinguished from the other two by its close indumentum of tiny crisped hairs which clothe the stems, leaves, bracteoles, ovary, sepals and keels of the petals as well as the fruits (the other subspecies are completely glabrous). It differs also in the erect sepals of the fruit and the 4-sulci which are most pronounced in dried collections but which disappear to some extent when the fruits are rehydrated. The apiculum on the tip of the leaf is also more pronounced in subsp. *tuvaluensis* than in the other two subspecies.

The plants here described as subsp. *tuvaluensis* were cited by Green (1979), who mentioned them as an example of one of the few species shared by New Caledonia and Tuvalu. While this is true, his suggestion that they could be relatively recent arrivals cannot be sustained. The Tuvaluan plants have been separated from those on New Caledonia long enough to have developed their characteristic indumentum and other minor differences mentioned above, and for these modified plants to have spread to at least two islands in the group. In fact, subsp. *tuvaluensis* seems to me to be more distinct from subsp. *prostrata* than does the geographically more distinct subsp. *coquana* which may indeed be a relatively recent taxon derived from long-distance dispersal by sea of propagules from New Caledonia.

Acknowledgements

Dr P.S. Green kindly drew my attention to the existence of the Vanuatu collections of *H. prostrata*. Mr W.R. Sykes sent me the Cook Islands material for identification, and provided photographs and ecological information for subsp. *coquana*. Without their encouragement I would probably not have re-examined this species and I thank them for their interest. The Curators of the Herbaria BRI, CANB, CBG, K and PERTH loaned material for study, and the final *Gonocarpus* illustrations were prepared from my sketches by Mrs F. Butterfield. The *Haloragis* drawings were similarly prepared by Mrs L. Button.

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